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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PS 0014 for a patent by JOSEPH MICHAEL KRAL as filed on 18 January 2002.

WITNESS my hand this
Eleventh day of December 2002

J. Billingsley

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TEAM LEADER EXAMINATION
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AUSTRALIA

Patents Act 1990

PROVISIONAL SPECIFICATION

MECHANICAL DOOR CLOSER

The invention is described in the following statement:

Mechanical Door Closer

Technical Field

The present invention relates to door closers.

Background of the Invention

Present door closer incorporate pneumatic or hydraulic means to control the momentum of the door.

Pneumatically controlled door closers have a limited life due to a lack of continuous or repeated lubrication to cylinders and piston seals.

Hydraulically controlled door closers are well lubricated, last longer than the pneumatically controlled door closers, however, when the seals wear out, the piston soon jams within the cylinder and the door is totally inoperable and, if force is applied to the door, the door may be unhinged, causing substantial damage to the door and the door jamb. In addition, the leaking hydraulic fluid damages the surrounding door and floor finishes and, in case of fire, the hydraulically controlled door closers may explode thus adding to the peril.

All presently available door closers require a substantial force to operate them. The very young, elderly or disabled persons may not be able to operate doors fitted with these door closers.

Object of the Invention

It is the object of the present invention to overcome or substantially alleviate the above shortcomings and to provide a better door closer.

Summary of the Invention

There is disclosed herein a mechanical door closer comprising:

a closing means to close a door, incorporating a slotted closer track, a spring, a carriage slide, a partially threaded shaft, a connecting arm and a pivot assembly;

a control means to control the momentum of a closing door, consisting of a brake mechanism, incorporating a brake hub with a drive hub, a brake discs, a concentric, axially sloping bearing surfaces and a brake shell containing one or a number of bearing balls or other rolling means which roll freely on lower parts of the said sloping surfaces of the brake hub when the door is opened and, when the door is allowed to close, are compelled to roll up the said sloping surfaces of the brake hub, forcing the brake hub and the brake shell apart, causing friction between the adjacent surfaces of the brake disc, the closer track and the carriage slide, impeding the momentum of the closing door and slowing down the rotation of the brake hub, allowing the bearing balls to roll down the said sloping surfaces of the brake hub, releasing the parting forces and friction, allowing the door to resume its closing motion and, with it, the brake cycle to start once more, the go - go slowly cycles repeating themselves until the door is closed;

a door locking means to prevent a door from closing, incorporating a cam latch which, when operated in an upward direction, effectively locks a door in a desired position; the door may be freed by operating the latch in a downward direction or by opening the door further.

The efficiency of the above mechanical door closer is high and substantially constant throughout its operation, because: when the door is fully opened, the recoil potential of the spring is at its optimum and the leverage exerted upon the door by the closer is at its minimum; when the door is closed, the recoil potential of the spring is at its minimum and the leverage exerted upon the door by the closer is at its optimum. The mechanical brake mechanism works only intermittently, therefore, most of the operation is free of resistance and of dissipation of energy.

Brief Description of the Drawings

Preferred forms of the present invention will now be described by way of examples with reference to the accompanying drawings wherein:

Figure 1 is a schematic depiction of a door closer for a hinged door.

Figure 2 is a schematic depiction of a sliding door closer.

Detailed Description of the Preferred Embodiment

In Figure 1 of the accompanying drawings there is schematically depicted a mechanical door closer wherein:

affixed to a door 1 is a slotted closer track 2 within which a carriage slide 3 may move linearly, its movement linearly restrained by a tension spring 4 of which one end is attached to a lug 5, incorporated in the carriage slide 3 and the other end is attached to a pin 6 affixed to the closer track 2; a partially threaded shaft 7 passes through a brake hub 8, incorporating a drive hub 9, a brake disc 10 and concentric, axially sloping bearing surfaces 11, and through a brake shell 12 within which one or more bearing balls 13 are contained; the threaded part 14 of the shaft 7 is screwed through a connecting arm 15 and locked in a desired position by a lock-nut 16, the other end of the connecting arm 15 is pivotally attached to a pivot assembly 17, affixed to the underside of the head of a door jamb 18; a latch 19 is pivotally attached to a lug 20, incorporated in the carriage slide 3.

When the door 1 is opened, the connecting arm 15 pulls the shaft 7, the carriage slide 3 and the brake mechanism 21 along the closer track 2, tensioning the spring 4 in the process; in that direction, the drive hub 9, adjacent to one side 22 of the slot in the closer track 2, drives the brake hub 8 in a rotational direction wherein the bearing balls 13, contained within the brake shell 12, roll freely on the lowest parts of the bearing slopes 11 and no force is exerted or energy dissipated.

When the force upon the door 1 is released, the spring 4 is free to recoil, pulling the carriage slide 3, the shaft 7, the brake mechanism 21 and the connecting arm 15 along, causing the door 1 to begin to close; the drive hub 9, adjacent to one side 22 of the closer track 2, drives the brake hub 8 in a rotational direction that causes the bearing balls 13, contained within the brake shell 12, to roll up the axially sloping bearing surfaces 11, forcing the brake hub 8 and the brake shell 12 apart, exerting pressure upon both sides of the closer track 2 and the connecting arm 15, the ensuing friction

between the brake disc 10, the closer track 2 and the carriage slide 3, slowing down the motion of the carriage slide 3 and through the shaft 7 and the connecting arm 15, slowing down the closing momentum of the door 1 which, in turn, causes the drive surface of the drive hub 9 to loose its grip upon the adjacent surface 22 of the closer track 2, thereby causing the rotation of the brake hub 8 to cease, allowing the bearing balls 13 to roll down the sloping surfaces 11, releasing the pressure upon the brake shell 12, the surfaces of the closer track 2 and the connecting arm 15, reducing friction, allowing the closing motion of the door 1 to resume and the brake cycle of the brake mechanism 21 to start once again, the go - go slowly cycles repeating themselves until the door 1 is closed.

When the cam latch 19 is operated in the upward direction, it pulls the lug 20, incorporated in the carriage slide 3, downwards and effectively clamps the closer track 2 between the carriage slide 3 and the cam latch 19, locking the door 1 in a desired position. The door 1 may be unlocked by operating the cam latch 19 in a downward direction or by opening the door 1 further.

The control intensity of the brake mechanism 21 may be varied by its size, by the angle of the axially sloping bearing surfaces 11, by the number and the diameter of the bearing balls 13 and by adjustment of the partially threaded shaft 7 screwed through the connecting arm 15 and locked in position by a lock-nut 16 or other means.

The abovesaid brake mechanism 21 may also be incorporated into the pivot assembly 17 and, as an alternative, the tension spring 4 may be replaced by a torsion spring, incorporated into the pivot assembly 17.

Both, the brake mechanism 21 and the cam latch 19 may be incorporated into any closer to replace the pneumatic or hydraulic control means and to provide adequate, presently unavailable, means to lock a door in a desired position.

In Figure 2 of the accompanying drawings there is schematically depicted a sliding door closer wherein: a door 23 is hung upon a head track 24, affixed to a wall, by two wheel assemblies, one of which is an idle

wheel assembly 25, incorporating a bracket 26, affixed to the door 23, a wheel 27 and an extended shaft 28 to which is attached one end of a spring 29, the other end of the spring 29 is attached to a nut and screw assembly 30 for tensioning of the spring 29. The wheel and brake assembly 31 incorporates a bracket 32, affixed to the door 23, a shaft 33, riveted or adjustably screwed to the bracket 32, a wheel 34, incorporating a brake hub 35 with one or more concentric, axially sloping bearing surfaces 36 and a brake shell 37, containing one or more bearing balls 38 or other rolling means. A latch assembly 39, pivotally attached to the bracket 32, incorporates a lever arm 40 and a cam 41.

When the door 23 is opened, it rolls freely on wheels 27 and 34, the bearing balls 38 roll freely on the bottoms of the sloping bearing surfaces 36 and there is no resistance.

When the door 23 is released, the spring 29 recoils and pulls the extended shaft 28 and, with it, the door along the head track 24; the wheel 27 rolls freely, the rotary motion of the wheel 34 is impeded by a brake action caused by the bearing balls 38, compelled by the rotation of the brake hub 35 to roll up the sloping bearing surfaces 36, forcing the brake hub 35 and the brake shell 37 apart, the ensuing friction between the base surface of the brake shell 37 and the adjacent surface of the bracket 32 causing the rotational motion of the wheel 34 to slow down and the closing momentum of the door 23 to expend itself. With forces thus released, the bearing balls 38 roll down the sloping bearing surfaces 36, eliminating the friction between the adjacent surfaces of the bearing shell 37 and the bracket 32, allowing the wheel 34 to roll and the closing motion of the door 23 to resume and, with the rotation of the brake hub 35, the brake cycle to repeat itself in a go - go slowly fashion until the door 23 is closed.

When the latch lever arm 40, of the latch assembly 39, is operated in an upward direction, the cam 41 engages the adjacent surface of the head track 24 and stops the door 23 from closing, effectively locking it in any desired position. The door 23 may be unlocked by operating the lever arm 40 in a downward direction or by opening the door 23 further.

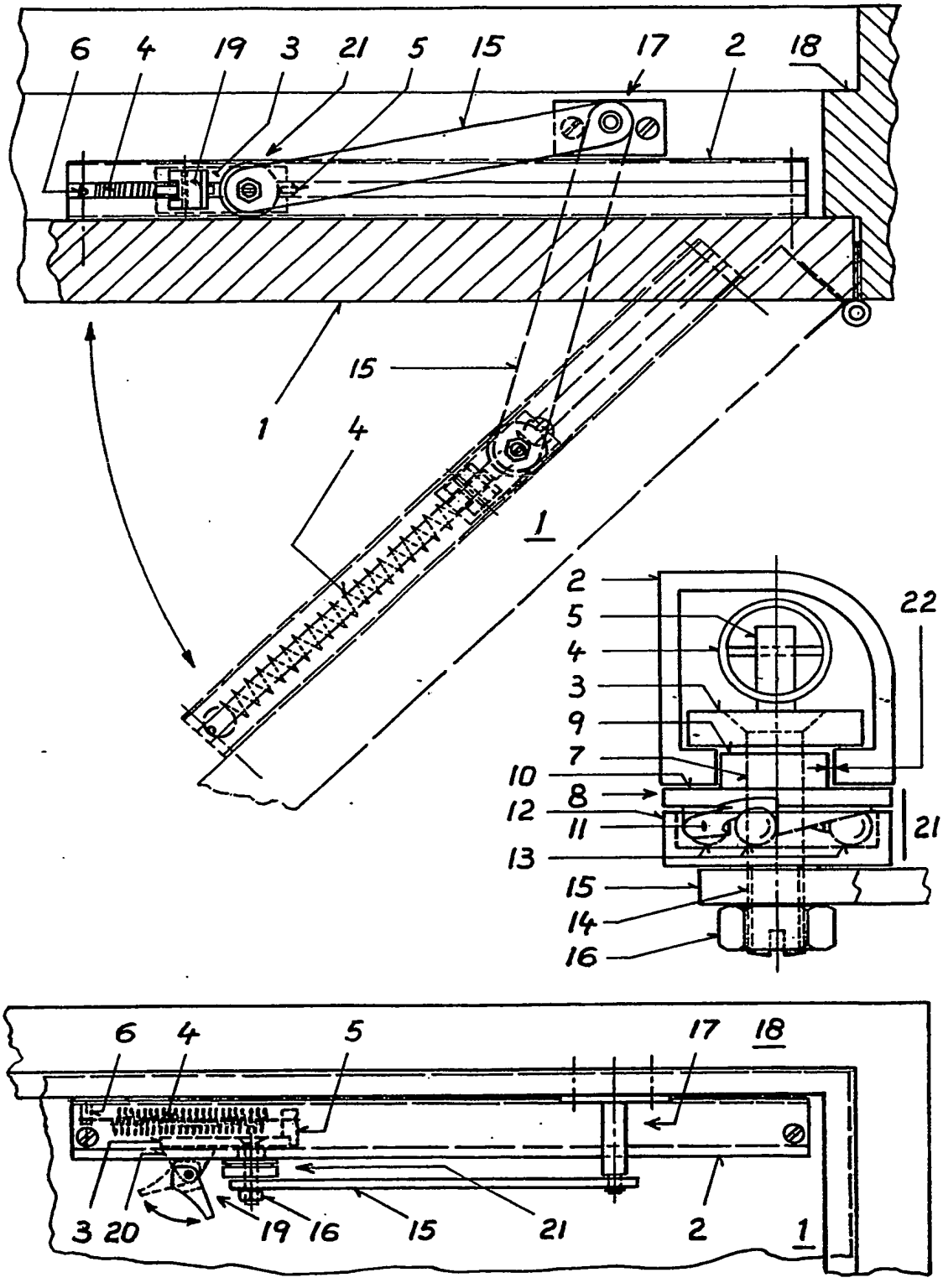
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FIG. 1

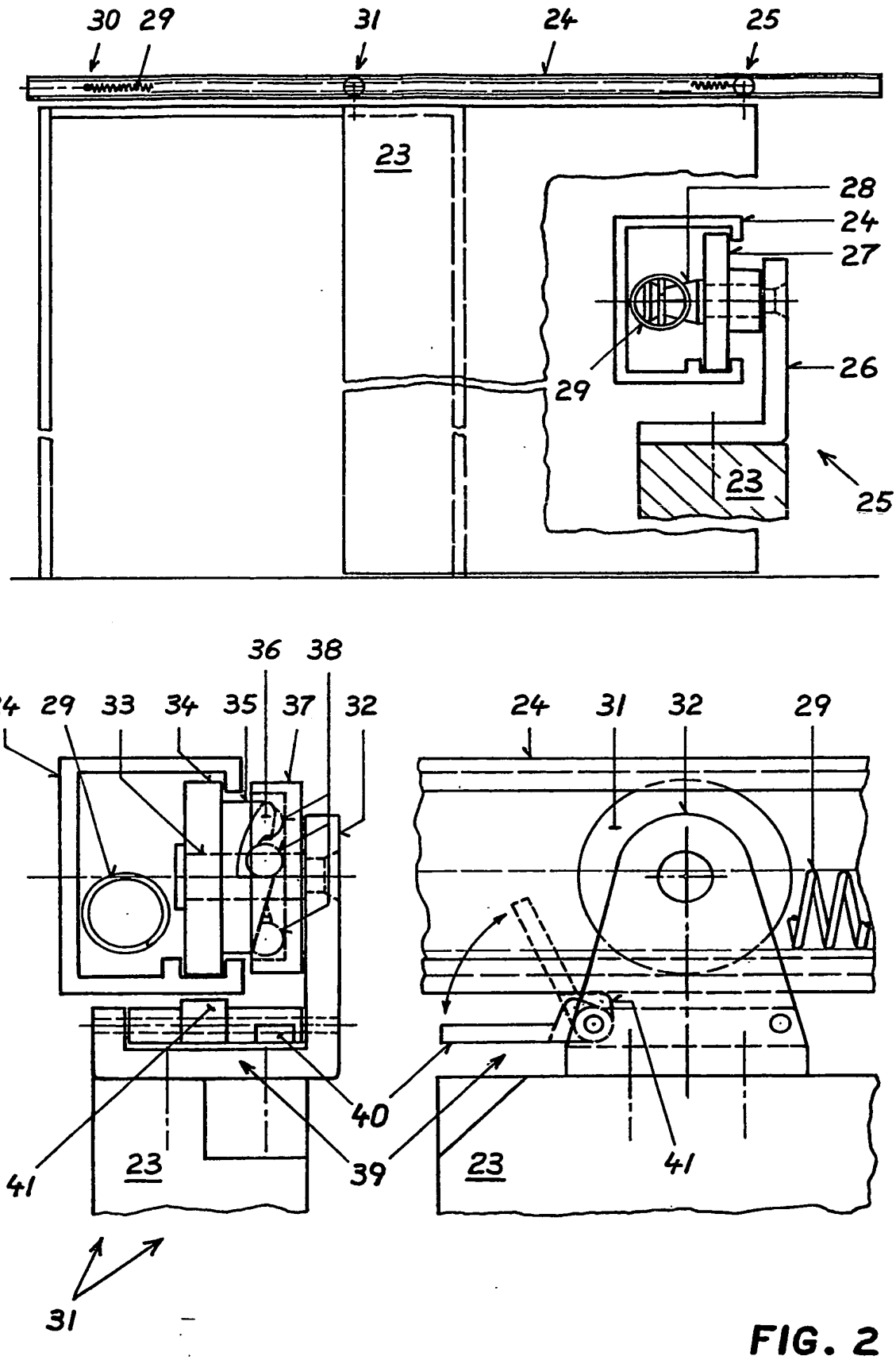
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FIG. 2